East Engin.
Library
TS
670
.A1
A51

Edwin M Baker

The MONTHLY REVIEW

Published by the

American Electro-Platers' Society

A SOCIETY FOR THE ADVANCEMENT
OF THE
SCIENCE OF ELECTRO-PLATING

JANUARY, 1934 Subscription $3.00 a year

Entered as second class matter at the Post Office at Springfield, Mass., September 8, 1930, under Act of August 24, 1912.

Acceptance for mailing at special rate of postage, provided for in section 1103, Act of February 28, 1925, authorized September 3, 1926.

HAVE YOU
CHECKED

your composition costs lately? Find the grade and type of Tripoli Composition that best suits the job at hand, and invariably it will prove the one that not only produces best results but costs least to use.

Also . . . cleaning costs will be less . . . and buff wear reduced.

The following three grades of Tripoli are representative of the complete Hanson-Van Winkle-Munning line:

A-6 for high speed hand buffing and automatic machine work.

B-5 for hand buffing only at medium speeds.

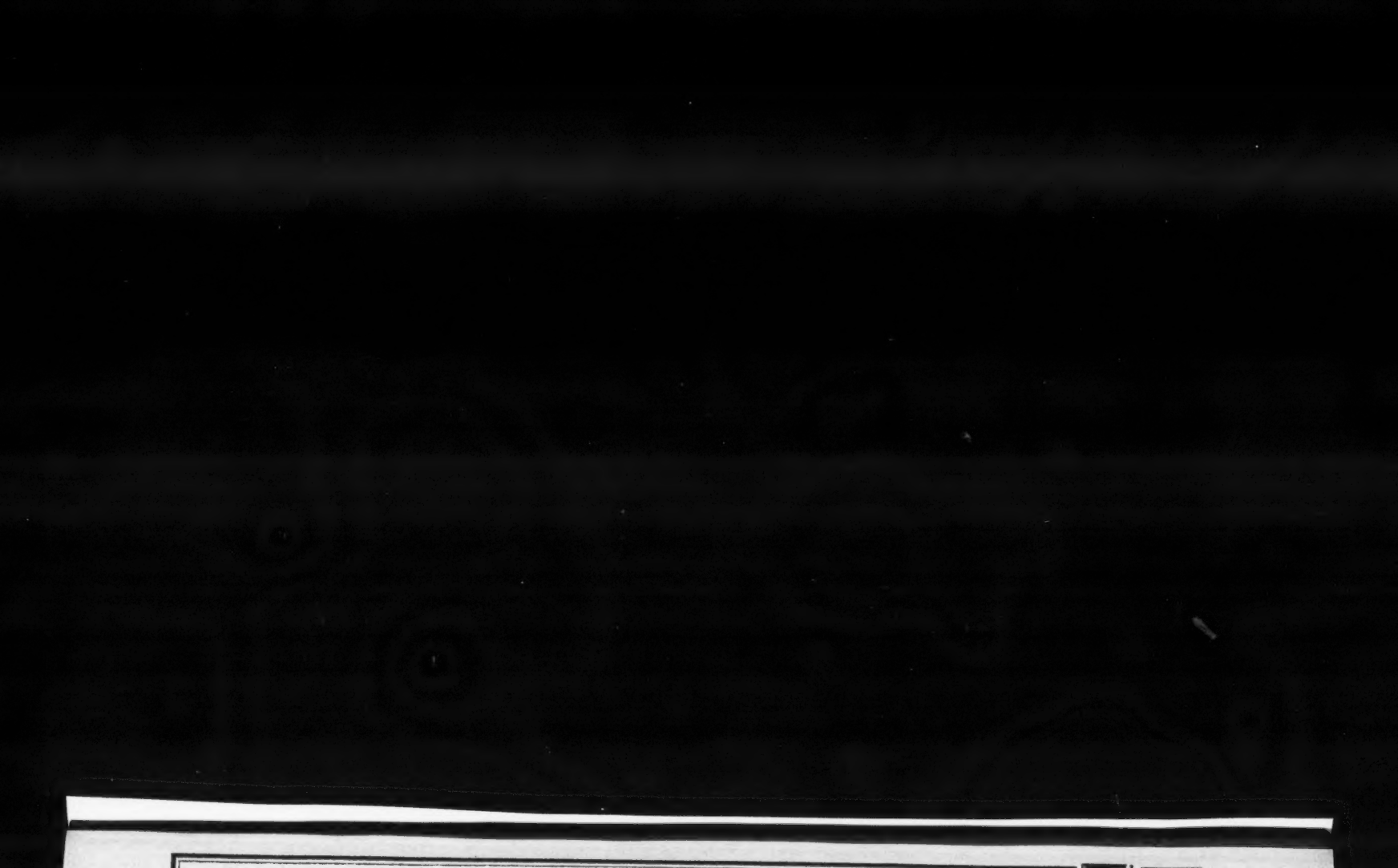
C-4 for low speed hand buffing.

Let us help you to determine the Tripoli that will reduce your costs.

HANSON-VAN WINKLE-MUNNING

HANSON-VAN WINKLE-MUNNING COMPANY, MATAWAN, N.J.

1341



An

VOL

W

been
woul
accu
and
Geor
have
the M

W
of M
and
point
prob
ing a

Ac
alwa
Hoga
read
mon

Ac
Van
a rep

Al
of C

Pl
acce

Table

E. Engineering Lib
Mrs. Edwin M. Baker
11-11-43
v. 20, no. 1-12

MONTHLY REVIEW

Published by the

American Electro-Platers' Society

Publication and Editorial Office
90 Maynard St., Springfield, Mass.

VOL. XX JANUARY, 1934 No. 5

EDITORIAL

SEND US YOUR PLATING PROBLEMS

WE have had a suggestion from Mr. T. F. Slattery, Chairman of the Education Bureau, that we start a "Question and Answer" column in the Monthly Review. This idea has been in the minds of many of our readers for some time, but who would be willing to undertake the job of answering the questions accurately? There is an extremely busy man in our organization and to him we went with our proposition. Our good friend, George Hogaboom, gave his consent, and now all we need is to have our readers send him their questions and the new column in the Monthly Review will be an established fact.

We are pleased to place the pages of our publication in the hands of Mr. Hogaboom for this purpose because of his wide experience and knowledge of plating from the practical and technical standpoints. We also realize that when his answers are given to any problems that may be submitted, they can be relied upon as being accurate and up-to-date.

Accuracy is essential in solving the plater's troubles and is not always found in the pages of many trade magazines. Mr. Hogaboom's knowledge needs no further comment to assure our readers that they can rely on his good judgment and sound common sense in the handling of this new section in our publication.

Address your letters to Mr. George B. Hogaboom, The Hanson-Van Winkle-Munning Co., Matawan, New Jersey, and watch for a reply in the next issue of the Monthly Review.

IMPORTANT NOTICE

All branches must take immediate action regarding the dates of Convention June 11-12-13-14, 1934.

Please notify Mr. Gilbertson, Sec.-Treas., if these dates are acceptable.

Table of contents page 48.

1934 CONVENTION

The following Committees have been appointed for duties to effect a successful Convention of the A. E. S. to be held in Detroit, June 11, 12, 13, 14, 1934:

FINANCE COMMITTEE

MR. WM. MCCORD.....16506 Wisconsin Ave., Detroit
MR. A. G. SPENCER.....1901 East Euclid Ave., Detroit
MR. HARRY CHERRY.....2842 W. Grand Blvd., c/o Van Winkle Co., Detroit
MR. A. B. WILSON.....801 E. Court St., Flint
MR. CHAS. BEAUBIEN.....1219 Dime Bank Bldg., Detroit
MR. T. W. KIRBY.....2700 Wight St., Detroit
MR. GEO. L. NANKERVIS.....8088 Military Ave., Detroit
MR. GEO. KUTZEN.....1087 State Fair, Detroit
MR. PERCY STAPLETON.....2621 West Fort, Detroit
MR. J. H. HANSJOSTEN.....14658 Eastwood Ave., Detroit

COMMITTEE ON EDUCATIONAL PROGRAMS

MR. CHAS. H. ELDRIDGE.....3220 Bellevue Ave., Detroit
MR. H. J. JAMISON.....1415 Third St., Detroit
MR. GUSTAF SODERBERG.....3220 Bellevue, Detroit
MR. B. F. LEWIS.....10398 American Ave., Detroit
MR. WM. W. PHILLIPS.....R.F.D. No. 1, Hunt & Southfield, Birmingham
MR. A. W. CARTER.....955 E. Hayes Ave., Hazel Pk.
MR. ELMER WOODMANSEE.....224 Adelaide, Detroit
MR. CHAS. MARKER.....15383 Manor Ave., Detroit
MR. HAMMOND.....1440 Washington Hts., Ann Arbor

ACCELERATED TESTS OF ELECTROPLATED METAL COATINGS ON STEEL

P. W. C. Strausser, Research Associate (Read by Dr. W. Blum)
Read at Chicago Convention, 1933

I. INTRODUCTION

DURING the past year, various laboratory accelerated tests were applied to the companion specimens of those used in the atmospheric exposure tests reported separately. The purpose of this study was to determine the relation between accelerated and atmospheric tests and especially to select, if possible, methods and conditions that will be useful in the specification and inspection of electroplated coatings.

This report is confined to specimens with a nickel or chromium finish. Similar tests in progress on the zinc and cadmium coatings will be reported subsequently when data on the corresponding atmospheric exposure tests are available.

In preliminary studies, a large number of accelerated tests were tried out. It was found that the only ones that yielded fairly reproducible and apparently significant results were the ferroxyl, salt spray, and intermittent immersion tests. This report summarizes the results obtained and their relation to the

exposure tests. Artificial industrial atmospheres, containing sulphur dioxide, carbon dioxide, and water, showed an attack of the nickel coatings, but did not yield reproducible or apparently significant results.

II. PREPARATION OF THE SPECIMENS.

The conditions used for plating the specimens were published in the May, 1932, Review of the American Electro-Platers' Society. A copy may be obtained on request to the Bureau of Standards.

Before applying an accelerated test, it is necessary to have the surface perfectly clean, so that the reagents will have full access to the coating or to any pores in it. The most convenient effective method of cleaning the surface is to rub it with a thin paste of finely divided magnesium oxide, followed by thorough rinsing. This treatment should be continued until a surface free from "water-break" is produced. This method was used in this study. Equally good cleaning may be obtained by "vapor cleaning" with suitable organic solvents; but this method is usually not so convenient for laboratory tests.

III. METHODS USED.

1—Ferroxyl Test. The liquid reagent for this test contained 60 g/l of sodium chloride and 0.5 g/l of potassium ferri-cyanide. For making the ferroxyl paper 10 g/l of agar was dissolved in the warm reagent and a 50 per cent white rag paper was soaked in it and allowed to dry.

In applying the test, the plated surface was cleaned with magnesium oxide, rinsed, and immersed for five minutes in the liquid reagent. The ferroxyl paper was then moistened, pressed on the metal surface and removed after five minutes. The number of blue spots (excluding those within $\frac{1}{4}$ inch of the edge) was recorded. The number of spots per square foot could then be computed from the fact that the area tested was 19 sq. in. Hence the number of spots per sq. ft. is equal to 7.5 times the number of spots per specimen.

2—Salt Spray Test. This was conducted in a room kept at 35°C (95°F). A 20-per cent solution of pure sodium chloride was used. The nozzle, air pressure and baffle were so adjusted as to keep a fine mist throughout the box and to wet the specimens uniformly. The latter were placed at an angle of 45° from horizontal. They were painted on the edges to prevent rust there, which might run over the surface.

The specimens were inspected at the end of 6 hours and after each 24-hour period, (though, as customary, the periods are expressed as multiples of 25 hours). At each inspection, they were washed lightly with running water and the number of rust spots on each was noted. If the corrosion was so pronounced that rust spread over the surface, the latter was cleaned by light rubbing with magnesium oxide paste, rinsed, and returned to the salt spray for four hours. This served to bring out the spots clearly without much spreading of the rust. In addition a rating from 5 to 0, on the same basis as the exposure ratings, was given to each specimen. The essential difference between this rating and the number of spots is that the former took into account also the size of the spots.

3—Intermittent Immersion. The intermittent immersion tests were also conducted with a 20-per cent sodium chloride solution. The cycle included one minute in the solution and fourteen minutes in air. The latter was kept at 35°C (95°F) and the relative humidity was maintained at 60 per cent ± 5 per cent. This insured a uniform tendency of the specimens to dry during the air exposures. Under these conditions they were visibly wet for about one-half the period in the air.

The specimens were inspected at the same intervals as in the salt spray and their conditions were similarly recorded.

IV. RELATION OF ACCELERATED TO ATMOSPHERIC TESTS

In the following comparisons, the data for atmospheric tests are the average scores up to June 1, 1933, at Key West and Sandy Hook. As explained in the report on exposure tests, the samples darkened so much at New York and Pittsburgh that exact ratings of the rust formation were impossible. At State College and Washington there have been too few failures to justify extensive comparisons.

The data may best be considered in connection with the important effects observed in atmospheric tests, and the possibility of detecting or predicting such effects in the laboratory. In Table I the data for laboratory tests are the averages of two or three specimens.

1—Ferroxyl Test. In all cases, the ferroxyl test shows effects of thickness that are roughly proportional to the corresponding effects in the atmosphere. It is evident that the protective value of coatings that contain copper, nickel and chromium is determined primarily by their porosity. Hence any valid test

for porosity, such as the ferroxyl, will readily distinguish between very good and very poor coatings, illustrated in this series by thin and thick deposits. On thin coatings, the ferroxyl paper usually revealed more spots than were shown in the other tests, while on thick coatings the reverse was observed, especially on deposits containing copper.

Specific effects are less easily detected by the ferroxyl test, though the results are usually in the right direction for thin deposits. For example, the porosity of No. 15 is greater than of No. 5, which corresponds with the effect of copper in the atmospheric tests.

2—Salt Spray and Intermittent Immersion. The salt spray test is usually defined in terms of the "time required for the first appearance of rust". Apparently, however, individual observers differ considerably in defining the size of rust spots that constitute failure. E. M. Baker defines failure as "rust plainly visible at a distance of three feet". Others in this field have tacitly ignored very fine rust spots. In designating the time for the first rust in the salt spray and intermittent immersion, we have recorded any rust visible to the unaided eye at the usual distance of 12 to 18 inches. The results so recorded were not concordant and the averages (in Table I) were not consistent. It was not unusual for duplicate specimens to fail in 6 and 50 hours respectively, in spite of the fact that the atmospheric tests and other observations showed that they were much more uniform than are most plated specimens. In some cases, a specimen developed a single small rust spot in 6 hours, and no more in 100 hours, while a specimen of a different set might show no rust in 25 hours but in 100 hours have 20 or more rust spots.

In general, the accelerated tests failed to develop the same kind and distribution of rust spots as are found in the atmosphere, even in marine locations. Evidently, no simple test includes all the factors involved in atmospheric corrosion.

The numbers of spots developed in 100 hours were not very uniform though the averages were consistent. A closer parallel to the exposure tests is shown by the ratings at the end of a definite period (for example 100 hours).

It is natural that the same system of rating, applied by persons familiar with the field ratings, should give better agreement than other methods. It remains to be seen whether a workable specification could be developed on that basis. Such a specifi-

cation might depend upon (a) the minimum rating (or maximum proportion of rusted area at the end of a specified period in the test), or (b) the time required, not (as is now customary) for the first appearance of rust, but for a certain proportion, for example two per cent of rusted area. At best it is difficult to estimate the actual or relative area represented by a number of small rust spots. On the other hand, the present commercial practice involves the personal equation to such a degree that it often fails to yield reliable or satisfactory results.

V. CONCLUSIONS

The ferroxyl test yields in a short time results for nickel and chromium finishes that correspond approximately to their behavior in the atmosphere.

The salt spray and intermittent immersion tests yield results that represent roughly the relative order in a marine atmosphere, provided that the relative extent of rust constituting initial failure, or the proportion of rust at the end of a specified period, is at least approximately defined, for example, by the system used for atmospheric ratings.

TABLE I

Atmospheric and Accelerated Tests

No.	Total Thick. Inch	At. Ex. KW + SH Score %	Ferroxyl Test Spots per Spec.	Salt Spray			Intermittent Immer.		
				First Rust Hrs.	Spots No. 100 Hrs.	Rating 100 Hrs.	First Rust Hrs.	Spots No. 100 Hrs.	Rating 100 Hrs.
				(a) Nickel					
52	0.00025	13	100	6	70	2	6	40	3
5	.0005	38	12	15	20	3.5	30	4	4
1	.001	67	3	25	3	4	30	2	4
6	.002	81	3	100	1	4.5	80	2	4.5
				(b) Nickel, Copper, Nickel					
53	.00025	5	200	6	100	0	6	100	1
15	.0005	17	40	6	60	2.5	25	35	3.5
13	.001	51	3	15	12	4	25	8	4
16	.002	71	0	6	9	4	75	2	4.5
				(c) Nickel, Chromium					
152	.00025	12	80	15	100	2.5	50	35	3.5
105	.0005	13	20	25	9	4	65	2	4
101	.001	56	1	50	2	4	90	1	4.5
106	.002	83	0	55	1	4.5	85	0	5
				(d) Nickel, Copper, Nickel, Chromium					
153	.00025	13	100	15	100	2	40	60	3
115	.0005	20	8	15	60	3	35	25	3.5
113	.001	41	2	15	20	4	40	25	3.5
116	.002	82	1	6	5	4	65	15	4.5

MR. SERVIS: Dr. Blum, in connection with copper previous to nickel we find, of course, that it corroded more than straight nickel alone. Would you credit this to electrolytic action?

DR. BLUM: I think that is safe to assume. We know, for example, if we put copper directly on steel and put it out in the air we will have rapidly accelerated corrosion. Mr. Hogaboom referred to the fact they were specifying copper fitted airplane fittings. It took a long time before they found out they should use zinc and not copper. Nickel would have been better than copper, and, of course, if they needed a good appearance nickel or chromium which we have now would be better for that, but I think there is no doubt copper is detrimental because if there are pores it accelerates the corrosion. If you make the coating thick enough so there are no pores, then the copper does no harm.

MR. SERVIS: Those surfaces were buffed in between, were they not?

DR. BLUM: Some were and some were not. If we buff the copper we get more protection than if we do not buff it.

MR. RONALD E. SHAW: I would like to ask for a little information about this ferroxyl test, how it is carried out?

DR. BLUM: Actually we carried it out under conditions which are slightly different from those commonly applied, that is, we used ferroxyl paper which we made up ourselves by having the solution of sodium chloride, sodium ferricyanide and agar and dipping white paper in it and letting it dry. In addition, we dipped the sample itself in some of the solution and let it stand there a few minutes before we put it on the paper just to be sure the solution had a chance to get through the pores. I don't know that that was necessary. We thought we got more consistent results, for it took ten instead of five minutes, and so we thought it worth while.

MR. DEGRAZIO: Nickel first and then copper, would that have a better resistance than copper and then nickel?

DR. BLUM: With a total thickness of one-thousandth which had both copper and nickel we had cyanide copper nickel. We had cyanide copper, acid copper, nickel. We had nickel as you had copper nickel. We had nickel cyanide copper nickel and some of them were buffed copper and some of them were unbuffed. The net result was if you take all nine of the sets on an average you can't see any distinct difference between them, so that the conditions under which either the copper or the nickel was deposited had no marked effect on the protective value.

MR. SERVIS: Under those conditions there is no question but that the copper is detrimental in the process.

DR. BLUM: Yes, at least so far as protection is concerned. At least, you must not count on it to furnish protection. If you use it, use it for some other purpose, not primarily for protection.

MR. H. C. COOMBES: Did you try cadmium on any of them on the base, right on the steel?

DR. BLUM: You understand we have samples out with cadmium and zinc without any other metals on but you are referring to the ones with nickel and chromium.

MR. COOMBES: There is one shop out west claims to get very good results with a very light flash of cadmium and then he puts his nickel copper and

nickel and chromium on and he has made quite a few tests with very good results.

DR. BLUM: We did not use exactly that combination. We have some samples that have cadmium, nickel and chromium and some that have cadmium copper nickel and chromium. Now in each case we get good protection against corrosion, but in each case we have some tendency for blisters and some tendency for white stains. In other words, if there are any pin holes we get some white stains instead of rust stains. That was our experience in these tests.

MR. SODERBERG: If I recall correctly the thickness of the copper deposits was relatively low all the time, wasn't it?

DR. BLUM: I would say it was relatively high. It was always a half thousandth of copper which is much more than is put on in many commercial places.

MR. ROMANOFF: Can you give us more information about the action of the sulphur in bringing up this black iron oxide?

DR. BLUM: The explanation: We took some of those samples from the Pittsburgh area and had them examined by an expert microchemist and he came to the conclusion that the black coating on the outside was actually magnetic oxide of iron and the only explanation we can give for it is that the sulphur compounds in the atmosphere get through the pores, attack the steel and cause the soluble compound sulphates to run over the surface; then they decompose to form the black oxide instead of the red oxide. That is the explanation we give. It was surprising to us to find that that was black oxide of iron on the surface.

MR. MUSICK: Is that the same thing we have in St. Louis, this brown?

DR. BLUM: My recollection is that Mr. Phillips in his reference to St. Louis browns had in mind brass plated with nickel and chromium and found that if the nickel was not sufficiently thick they got brown stains which they attributed to the copper compound from the brass coming through the coatings. I think it would have nothing to do with this case where it is a steel base.

MR. MUSICK: I think he might be mistaken so far as the copper is concerned because it forms on brass just the same unless it is caused by the action of the brass also. Nickel plated and chromium plated had as much brown as some of the others.

DR. BLUM: If it is due to copper, yes. I had in mind particularly the fact if it is an iron compound, of course, it could not form on the brass parts, so I think the two things are different. I believe the St. Louis browns, Mr. Phillips referred to are a product of corrosion of brass that is exposed through porosity of the nickel and chromium coating. The black coating we have is the result of the corrosion of the iron exposed to the coating. I think there is a difference.

MR. MUSICK: It forms on bumper bars and there is no brass on bumper bars.

DR. BLUM: You do get brown there?

MR. MUSICK: It is very easily dissolved by ordinary kerosene.

DR. BLUM: We did not run into anything that I would think of as characteristic brown in our test. It was quite definitely black.

MR. HOGABOOM: As I stated at the meeting, I think it would be well to try to remove that black coating the same as Phillips did the brown coating by dipping it in cyanide. It came off when he dipped it in cyanide, but unfortunately there are none of these blacks that have been dipped in cyanide so as to compare it.

DR. BLUM: We did clean some of them, scour some. I have some in my bag here in order to find out whether there are pores in the coating. We just scrubbed off the black and found that the coating was badly attacked underneath. At Pittsburgh the other day I took about a half-dozen samples which I am taking back to Washington with me to make a further examination on just such points as Mr. Hogaboom has brought out.

MR. MUSICK: I know that in any first-class work being done along established lines you could almost guarantee. A job shop could guarantee plating for the life of the car, if it is kept clean. We did that several years ago and came out with an ad guaranteeing our chromium plating for the life of the car. We had some cases that we had complaints on but we found they did not keep the car clean. So when we came out with our new price list we included the statement that we guaranteed the plating for the life of the car if kept clean. We made it pretty strong and I know that any plater can make a similar guarantee if the customer will keep the car clean.

DR. BLUM: Yes, that confirms what I stated there that the conditions on a car even in the worst locality are usually a good deal better than these samples which were out twenty-four hours a day under all weather conditions.

MR. COOMBES: We found the reason why the chromium plated parts would rust faster than the nickel parts on a car, right at the first. If they start to rust within the first month or so, I think the reason is that when you send a nickel job out you have just been buffing with white finish, it has a certain amount of grease in it which you rub into the pores preserving the nickel from rusting. Where the chromium has been pulled right out of the chromium tank and maybe just wiped off and the grease is dissolved and you are sending out an article that is chemically clean ready for moist air to work on it. If people wipe the chromium, the job will last indefinitely. It is more apt to rust when it is chemically clean.

DR. BLUM: I think that is very sound advice. The difficulty is that the plater may be handicapped slightly if he advises the customer to rub wax or grease over the surface and yet at the same time there is no doubt that the public could be educated to do that and then plating would be able to hold up a whole lot better than it does under some of the very severe conditions sometimes imposed.

MR. WILHELM CASTELL: May I ask about that two-thousandths plate on the nickel copper nickel? You show first six hours. Still it has the highest rating.

DR. BLUM: Exactly, but that is just the point that I mentioned about the first rust, that is, you might have a sample or even two or three samples in which a single small rust spot would appear in a short time and then you could run it for one hundred hours and no more rust spots would appear. You notice here in the salt spray that there were only four spots at the end of one hundred hours, so that the time that the first rust spot appears I don't think has much to do with the quality of the coating. I distinctly feel that it

is a mistake to use the salt spray test expressed in terms of the first appearance of rust, unless you define a sufficient amount of rust to represent actual failure and not merely some very small pin hole.

MR. CASTELL: What is the ratio between the nickel and copper on these samples?

DR. BLUM: In most cases where the coating contained copper the thickness of nickel and copper was the same; that is, about fifty per cent of each.

CHAIRMAN HAY: Any more questions, gentlemen?

DR. DEGRAZIO: If we could take care of our plating it would go three or four times longer. Driving in the sun, the car gets covered with dust, alkali dust on the gravel road, with sometimes rain on top of this. Then the car is put in the garage without wiping off the hot lamp. Leaving this dust on it all night hurts it. If we educate people to wipe off their cars, especially in such cases, the plating deposits are going to last three or four times longer than they do today. I have a car seven years old, the lamps on which were plated six years ago. They are steel lamps—nickel-copper-nickel—that are as good today as the day I put them on.

MR. SERVIS: I think what the gentleman over there mentioned has a great bearing on the rapidity of the first corrosion on chromium. I firmly believe that if it is buffed afterwards with these compositions, that it certainly serves a useful purpose and retards the beginning of corrosion for a certain length of time. There is no question about that. It serves a useful purpose.

DR. BLUM: I will repeat the question somebody asked me this morning in the discussion: That is, whether it wouldn't be a good idea if all the plated ware for outdoor use was just given a wipe with grease or wax before it was sent out and put on the cars. If that could be made a regular practice, it would undoubtedly add to the life. I don't think that we should consider such a procedure any apology for plating because we are simply dealing with facts and we know that it is humanly not possible to make any plated coating that is absolutely perfect, or, at least, if you did the price would be prohibitive. But if you could do a good job of plating and give it initially a light wipe with wax or oil, it might add greatly to the life of the article.

MR. COOMBES: I thought we could get some chemist to figure out an oil or a wax that would be best suited and experiment with dipping the articles in it before they were sent out and then wipe it off. It might be that there are some penetrating oils that would go down into the pores sufficiently so that the oil wouldn't be noticeable and yet it would give a lot of protection.

CHAIRMAN HAY: Any more discussion, gentlemen?

MR. ROMANOFF: Would you recommend copper over commercial steel which ordinarily has many minute pits and imperfections prior to nickel, taking as an example a half thousandth and add a total thickness of the deposit? Would you recommend using on there one-tenth of copper buffed prior to putting on four-tenths of nickel?

DR. BLUM: I don't know whether as little as ten-thousandths of copper would have enough value to warrant its use at all even for the purpose of finishing. Of course, that would depend on how smooth the surface was to begin with. But your question is very much to point and can best be answered this way: We purposely used in this work a good grade of cold, rolled steel because if you are going to make 7,000 or 10,000 specimens, unless you have

a uniform material to start with you can not hope to get uniform or consistent results. But by that very fact we did exclude this problem that you raise about the best way of plating steel which does not have a good finished surface to start with because we have no first-hand experience through investigation. My suggestion that the copper might be advantageous in that case would be based on general principles that if you have, say, hot rolled steel or steel that has flaws and imperfections, that a coating of copper subsequently buffed may help to cover those up and make it possible to get a better nickel coating than you could have otherwise. Now in that case, however, I suggest if conditions permit that you figure how much nickel you are going to put on and then put on the copper in addition rather than instead of the nickel. Do you see the point? If you need a half thousandth of nickel or one thousandth of nickel put that much on and then put on copper in addition if necessary in order to get the surface you want.

MR. MUSICK: How long do you think it will take before the steel plates become perforated plates?

DR. BLUM: We have no cases of that as yet although some of the samples in Pittsburgh are going pretty badly now. That question of how long the tests will run depends upon location. To all practical purposes in Pittsburgh they are almost all zero; in New York not quite so bad; at Sandy Hook they are going pretty badly and curiously enough at Key West they went badly at first, but haven't gone so badly since then. They either failed rapidly or else held up pretty well. In Washington State College anything that is half a thousandth or over is nearly as good as the day it was put out. I told Strausser he should have made a contract with the Platers' Society to employ him as long as those specimens lasted. Then he would be sure of four or five years. I came out last week and drove through State College and actually the glare on our eyes from those specimens that had been out fifteen months was so bad that it was all we could do to look at them. So you see, you can't make any one rule but you can say that it takes a mighty good deposit to stand up a year in a very bad location.

MR. HOGABOOM: I think it would be well to emphasize the point that was brought out in the discussion the other day that whether an article has a certain salt spray or whether it has a certain outdoor life depends entirely upon the locality in which it is exposed. If you are manufacturing goods for all over the country and if the goods should fail in one locality it is no sign they are going to fail in another locality. Locality plays a very important part.

CHAIRMAN HAY: Any further remarks? Dr. Blum, I want to thank you very much for your reports. (Applause).

DR. BLUM: I am going to take the liberty of speaking again. I have presented all of this subject matter quite impersonally, feeling I was simply representing these various people, but Mr. Hay has referred to Mr. Strausser. It is true he has been working under some discouraging conditions and uncertainty, with banks closing and checks being returned and various conditions of that kind which were unavoidable, but I want to tell you that Mr. Strausser has been on the job not seven hours a day, which is our regular working day at the Bureau of Standards, but ten and twelve hours a day. He has come in night after night to make inspections when they were required

at the end of a certain period. He has come in every Sunday for the last several months in order to make it possible to get these results completed and particularly to get as nearly complete a report as possible for this convention.

I want you to feel not only that Mr. Strausser is working, I mean in the sense he is on the job, but in working for you; he is working as hard as it is humanly possible for anyone to do to complete this program. I certainly hope even though it may not be possible in the nature of things for this organization at present to give a written guarantee or anything of the sort, that I can go back to Mr. Strausser at least with evidence of the spirit and enthusiasm of this organization and tell him that if you have a dollar to your name you are going to keep him at work.

ANNOUNCEMENT

A Grand Reunion of all who are now and who have been associated in any way with the Electroplating industry is being planned by the Newark Branch of the A.E.S. We ask and urge all who are able to come to Newark for the sake of *Auld Lang Syne* on Saturday, April 7, 1934.

TO THE BRANCH LIBRARIAN

Greetings:

The Educational and Program Committee, of which you are a member according to President VanDerau's recommendation, presents the first paper of a monthly series on such topics as Executive Principles, Organization and Industry, Principles of Good Management, etc.

These papers will be plain, simple and practical discussions of those things which form the foundation of real progress for the individual foreman and superintendent.

It is the desire of the committee that you designate a member to present these monthly papers who will be willing to read the papers once or twice before the meeting, so as to bring out the strong points and not stumble over the important sentences. He should also take charge of the discussion after reading the paper, as it is the desire of President VanDerau that we get real results from these papers—interpreted with a good discussion at the meetings and action in the various shops where our members are employed as foremen or superintendents.

Your comments on the papers are desired, and a detailed re-

port on the discussions and questions submitted by the members will be greatly appreciated.

Very truly yours,

T. F. SLATTERY.

CLEANLINESS AND ORDER

By Edward H. Tingley,
Secretary, National Association of Foremen

With acknowledgment to Dr. Harry Meyers, deceased, formerly of the Frigidaire Corporation.

SOME time ago, in speaking to a group of foremen, Mr. C. F. Kettering, Director of Research, General Motors Corporation, said: "The whole fun of living is trying to make something better." Do you find many people who get their fun in that? It is my experience that most people get their fun out of proving that *what they have done is right.* When someone comes to them with an idea for improvement, they take great pride in finding something wrong with it.

Here is what happens in the average man's mind. He is listening to the new idea with about one-tenth of his mind and the other nine-tenths is being used working hard to fix up an excuse why he has been doing it that way and that his way is right. Have you met any men like that in your plant?

In this paper, we are going to discuss the most important thing that makes for better products and better people—the subject of ORDER.

Everything comes through work. Our present civilization is the sum total of people's work. Our work is our contribution to the advancement of the world, so we are interested in doing good work. What is a definition of work? Work is the use of time, energy and materials. There are two kinds of work—GOOD WORK and POOR WORK.

GOOD WORK is the *right* use of time, energy and materials.

POOR WORK is the *wrong* use of time, energy and materials.

Now, what makes poor work?—just one thing—waste. Waste is the misuse of time, energy and materials.

Your job and my job is to make a better product at a lower cost. You will buy the products from a company that does that for you. Right now there are a lot of things that you would like to buy, but you are not buying. You don't think you can afford them, but I will tell you exactly when you will buy them; it will be when you think you can afford it. So the

biggest thing that any company can do to sell their product to you is to lower its cost.

Now, do you believe this: that in the lowering of costs, you have control of only one thing, and that is waste? There are three kinds of waste: time, energy and materials. In other words, there are three things to misuse. Now, there is nothing that wastes all three of these like disorder. You start to do something, and if things aren't in order you start immediately to waste time. In other words, you can do a thing quicker and easier if a plant is in order. Now, what is order?

WHAT IS ORDER?

Order is just the arrangement of time and materials so that work can be done. If it is good order, if it is perfect order, you will use time and materials to the very best advantage. There are two kinds of order: the order of time and the order of things. Order, real order, is the right arrangement of time and materials, so that work can be done. How do we know when a place is in order?

We all know that old definition: "When everything has a place and everything is in its place." That's a good definition but there is one thing wrong with it: it allows for an attic.

DO YOU HAVE AN ATTIC?

What is an attic? An attic is a place where you put stuff that is not good enough to use, and too good to throw away, and not much ever comes out of an attic. Any time you save enough stuff that you get in disorder by saving it, it will cost you money. It will not only slow up work but it probably won't be long before somebody falls over it and is injured. Safety has a very direct connection with order. In fact, order is the first principle of a safe shop.

Dr. Stewart, Chief Statistician of the United States Labor Department, says: "Slips, falls and stumbles cause more accidents than machinery." And slips, falls and stumbles are caused more from dirt and disorder than anything else.

CONGESTION IS DISORDER.

Recently the manager of a plant visited another factory noted for its excellent order. He complimented the manager of the orderly plant and excused his own disorderly plant on the grounds that it was very congested. In fact, he was contemplating an addition to the plant to provide room for more workers.

After a thorough discussion of the advantages of order, he returned to his plant and began to check up on order. In three weeks he reported that he had taken out enough old stuff to make room for thirty additional men, thus saving the building of the addition to the plant. Many congested plants and departments are disorderly—when they are cleaned up, much good floor space is found.

ARE YOU IN ORDER?

When is a place in order? A place is in order when there are no unnecessary things about, and the necessary things are in their proper places, and no in this sentence means none, Not Any, Not-Even-One.

Remember, this thing has to begin with you, and has to start with you on your personal things if it is going to go far. So start in tomorrow, no, start now; start right now on the inside of your pocket, and see what you have in there; get that stuff out and then when you go to your plant, start on the subject of order at once.

BEGIN ON YOURSELF

AND listen: Don't you go out and raise a big fuss with your men before you get orderly yourself.

Don't expect your men to do better work than you do. Water doesn't rise higher than its source, and the bunch doesn't get bigger than the boss. So you lead the way—you set the standard—and then let your men follow you. Yes, get your own office clean and orderly, and then call in some of your best men and ask them if they can see any change. Watch their eyes open up. Watch their smiles. See if they don't say, "Well, I should say there is a change." Don't be surprised if they make it a lot stronger than that. Then tell them how you did it, and ask them if they can't do just as well on their own jobs. I'll bet they'll say they can—and then watch them. I've seen this done in so many factories that I know exactly what will happen. And I know this—you'll all have a lot of real fun doing it, and so will your men. And all you have to do is to interest them in it. And then watch it spread to the other departments. Yes, watch it spread right through the whole plant—to those above you and those working with you. Yes, and watch it spread into the homes. And, until it does spread into the homes and we find every one taking better care of his own things, the idea has

not really gotten hold as it should, and as it must, if we are going to make successful people. And I am sure it will get hold in this manner if you really interest them in the subject.

MAINTAINING ORDER

One of the best ways to get and maintain an orderly shop is to have each one of the foremen in turn act on a committee of inspection. This can be made a most interesting shop procedure, and here is how it is done: List the foremen alphabetically and then have a committee of three make an inspection of the entire plant, giving each foreman a written report on his department of anything that is found to be in disorder. This committee should change each week, which means that each foreman serves soon on the committee. Safety inspection can easily be included in the work of this committee also. I have seen this carried out in many a plant. If done properly it always creates a great deal of interest and this interest, of course, is the first essential in getting things done right.

ORDER IS NOT JANITOR WORK

A lot of people think of order in terms of janitor work. I have gone into many a factory and told the foreman that the place was in disorder, and have had him say to me, "Yes, they took one of my janitors away, what can you expect?"

Now don't consider order from the standpoint of janitor work. If you are now so mussed up that there is a lot of dirt and disorder in your place, the removal of that dirt will be janitor work. Yes, removing a lot of dirt and disorder is janitor work, but preventing that accumulation is management.

Don't think only of getting your plant clean at 4:45 on Friday afternoon. I know a lot of places where they give them fifteen minutes to clean up on Friday afternoon. What does that do? It stops production which costs money and only gives them a little better start for Monday.

If you are going to be in order, you must be in order right straight through all of the time, with no unnecessary things about at any time.

HENRY FORD'S ADVICE TO YOUNG MEN

The American Magazine gives this interesting interview:

Mr. Ford was asked this question, "If a boy is trying to fit himself for industrial leadership, how should he go about it? What are the important things for him to know?"

"There are five things which are fundamental, and they have to do first with cleanliness. The first advice I would give to any boy starting in today would be that he should learn to keep himself and everything around him clean. If he is able to do this, he is one in a thousand."

So, you fathers, if you want to make your boy stand out, one in a thousand, teach him to be clean and orderly.

Mr. Ford says further: "Neatness, cleanliness, orderliness, the importance of these things is due to the fact that they have a great effect on the way a man's mind works. The man who keeps himself and all his tools clean is apt to do things well."

Dirt is always evidence of waste, either of material or of mental and physical energy or both."

Mr. Ford was once asked what he would do if he were called on to take charge of a business that had failed. "No business I know of ever went to the wall without accumulating a vast pile of dirt. The dirt and all that goes with it, untidy thinking and methods helped to cause the failure. The first thing I would do would be to clean up that business."

THE MONEY VALUE OF ORDER

Mr. Hobbs, the President of the Detroit Seamless Steel Tubes Company, wrote in the April Foreman's Magazine that four years ago he got hold of one of the Frigidaire Company's books on the subject of order. What he did as a result of applying these ideas is one of the most conclusive things I have ever read on this subject.

Up in the corner, he quotes: "Carelessness is the thing that causes most of the poor work in factories. The main signs of carelessness are dirt and disorder."

"Four years ago we started an experiment in our mill—an experiment in cleanliness and order. We wanted to determine, if we could, whether they had any practical manufacturing value. We planned to reduce them—if they could be so reduced —to cold figures of percentage or of 'dollars and cents.' We hoped to take them out of the realm of abstractions, to establish them as practical working assets in our own very practical business of making tubing of seamless steel.

"Now four years have passed since that experiment was started.

"In those four years we have transformed our plant. Instead of the usual dirty, messy, smoky, snarled-up tube mill, it has

become a well-lighted, orderly, modern plant. It would be acceptable, we fondly believe, to the most fastidious of manufacturers.

"And in the same four years we find that our records show these figures:

"50% decrease in stores inventory.

"25% decrease in man power required to operate the mill.

"31% decrease in accidents.

"A steady decrease of production cost and a correspondingly steady increase to our present peak of 99.6% perfect quality as measured by customers' rejections.

"To us these figures are conclusive. On their testimony we base this article of our business creed:

" 'Make a man proud of his job, happy at his work, loyal to his company—and he must inevitably make a better product. Orderliness increasing his individual efficiency, increases the efficiency of the entire mill. The sure result is greater production, of better goods, at lower cost—increased business, increased prosperity all around.' "

How do you like that?

DISORDER MAKES HIGH COSTS

Order is the first step in doing anything right, and if you can't manage the order of your department, you can't manage your department. It does not matter what you are doing, if there is dirt and disorder in your department, your costs are still higher than they should be. Anybody can come into your department and not know one thing about it, and if he can get that department orderly, he can cut your costs, for there isn't a thing that will cause waste like disorder.

This is so true that here is a real standard for good production—No one should own or control more property than he takes good care of. This is called the Property Index. No foreman is ever given a promotion to a larger department if he does not take good care of the smaller department's equipment.

THE THREE STEPS

To get order there are three definite procedures you go through: First, is observation. You have to look, and examine everything that is in your department.

The second thing is to arrive at a decision on what to do with some things. Is it scrap or is it good? Does it belong here or over there? Now, maybe you will have to call an inspector or

your boss to get a decision, but if you are going to be in disorder because you can't reach somebody, something is wrong in your organization.

First, you will have to observe; second, make a decision; third, you will have to act, yes, you will have to carry out the results of your decision. Look—Decide—Act.

Those three things will make a success out of you or out of anybody else. That is why it is almost impossible to ever find places that are clean and orderly that fail.

If you doubt the effect of cleanliness and order upon success watch yourself and others and see where you go to trade:

Do you go to a clean and orderly gas station, or to a dirty and disorderly one?

Do you like to get your car fixed in a clean and orderly garage, or in a dirty and disorderly one?

Do you go to a clean and orderly barber shop, or to a dirty and disorderly one?

Do you go to a clean and orderly grocery and meat market, or to a dirty and disorderly one?

Do you go to a clean and orderly doctor's and dentist's office, or to a dirty and disorderly one?

And when you hire men to work for you at your home, do you like to have them clean and orderly or dirty and disorderly?

CLEANLINESS MAKES SUCCESS

Mr. C. F. Kettering recently returned from the Panama Canal Zone and I heard him say the French Government spent five hundred million dollars in the Panama Zone and did not get a canal. Our Government spent four hundred millions and got a canal. What did the American engineers know that the French engineers did not know? They had this one fact, that mosquitoes carried yellow fever and malaria. That was what made that whole zone impossible to live in.

With that one thought, they got the whole zone clean and orderly, and wiped out yellow fever and malaria, two of the most deadly diseases we ever had.

And, just as we have wiped out the scourges of malaria and yellow fever, we can wipe out the scourge of unemployment and poverty if we can get people clean and orderly and taking good care of their property. And this thing has to get hold of the individual. A lot of this you will have to sell to your men so they will want to keep their machinery and work places clean,

and if you do it that way—you will have a clean orderly shop and yet your janitor expense will be less than before with a dirty shop.

Don't look upon this as a matter of expense. It always saves money for, as we have proven, one of the best ways to cut costs is to get a clean and orderly plant. But remember, each man should be sold the idea that he is to keep whatever he is working with, clean and orderly and if you can get him keeping things clean in the factory maybe he will take good care of his own property. Yes, perhaps he will take good care of his automobile. I haven't much hope for anyone unless he does take good care of property.

PERSONAL SUCCESS

I have asked a lot of garage men how many machines they have ever seen that wore out, and they all say practically none; they burn out, they are bumped out, they rust out for lack of care, but they don't wear out. And nobody can ever get ahead if he saves up for a year or two to buy something and knocks it all to pieces in a few months. It can't be done that way, and that is why, if you find an individual who takes care of his own property, takes good care of property wherever he is, some way or other, that individual is always getting along well. If you don't believe it, examine people generally, and see if it is not true. And if you do, you will come to the conclusion you can't be careless if you are clean and orderly and take good care of property.

So, be clean and orderly. Look—decide—act, and see how your department and your home improve. And I know the results will be that your company will make better products at lower cost, which will mean greater success for all.

● TELL your Supply Men about the Advantages of advertising in *The Monthly Review*. We need your Co-operation.

ABSTRACT SECTION

EDWARD B. SANIGAR

These abstracts are mostly adapted, by permission, from "Chemical Abstracts", the references to that publication being given in the form — *C. A.*, **27,** 3402 (1933) *i. e.*, Chemical Abstracts Volume 27, page 3402 in the year 1933. The name appearing at the end of the abstract is that of the abstractor. Abbreviations for scientific journals are those used by "Chemical Abstracts" (see *C. A.* **25,** 6019 (1931)). E. B. S.

Chromium plating. M. LEMARCHANDS and M. ABRAMOVITCH. *Bull. soc. chim.* **53,** 429 (1933).—Chromate salts are not suitable for the electrodeposition of chromium. The chromium must be in the chromic or chromous form, and it is not economical to reduce the chromate electrolytically previous to deposition. The authors found that the chromium must be in the chromous form to give a good metallic deposit. The direct deposition from the chromic ion is impossible. The electrolyte should contain 0.71g. chromium per liter, and deposition with a chromium anode upon a copper cathode at 18°C. gives good deposits. It is advisable when using a chromic salt to add a little chromous salt, that is begin with partial reduction of the chromic ion. Ammonium chloride (0.05%) added to the bath is advantageous. Deposits made under the above conditions were very adherent and hard. To give a uniform deposit the cathode should be turned from time to time and the electrolyte agitated. *C. A.* **27,** 5251 (1933). H. E. M.

Plating aluminum with chromium. U. S. patent No. 1,923,790. August 22, 1933. G. L. MOORE (to Aluminum Company of America).—An aluminum alloy having an oxide coating is brushed with a wire brush impregnated with molten tin to remove the oxide coating and deposit a coating of tin, and chromium is then deposited on the tin. *C. A.* **27,** 5257 (1933).

Chromium plating cylindrical objects. French patent No. 748,782. July 8, 1933. Fescol Ltd.—The anode is tubular and surrounds the object to be plated, which forms the cathode. *C. A.* **27,** 5257 (1933).

Electroplating. British patent No. 394,117. June 22, 1933. Fescol Ltd. and R. E. WILSON.—Tubular anodes are used in which the articles are supported in a stationary manner, for example by wires from a bar. *C. A.* **27,** 5654 (1933).

Electroplating with chromium. U. S. patent No. 1,928,284. September 26, 1933. C. G. FINK and H. D. McLEESE.—An electric current is passed through a solution containing chromic acid and a soluble fluoboric compound, such as hydrofluoboric acid, the amount of the latter corresponding to 3g. or less per litre of fluoboric acid for a solution containing 250g./1. of chromic acid and being proportionally higher or lower for higher or lower chromic acid content. *C. A.* **27,** 5654 (1933).

The anodic behaviour of nickel III. KONRAD GEORGI. Z. Elektrochem. **39,** 736 (1933). (Compare Monthly Rev. November 1933, pp.

35-6. E. B. S.).—In the passage from the active to a more noble state, the diminution of the hydrogen ion in the diffusion layer is involved; from a higher potential on, perhaps the formation of oxide layers on the most soluble spots is also effective. Completion of the oxide layer prevents further Ni^{++} formation and increases polarisation.

C. A. **27,** 5650 (1933). C. L. WILSON.

The anodic behaviour of iron. KONRAD GEORGI. Z. Elektrochem **39,** 745 (1933). (See above abstract. E. B. S.).—The anodic behaviour of iron electrolysed from wrought iron is compared with that of nickel and cobalt (see Monthly Review November 1933, pp. 35-6. E. B. S.). The size of the anion and the pH have a strong influence on the passive state as with nickel and cobalt. *C. A.* **27,** 5650 (1933). CURTIS L. WILSON.

Forming separable coatings of nickel on surfaces such as those of iron, copper or brass. U. S. patent No. 1,924,410. August 29, 1933. C. E. MARKER (to Chrysler Corp.).—A film of chromic acid solution is formed on the surface of a metal plate such as iron, copper or brass to prevent the adhesion of nickel to the plate. Nickel is plated onto the film-covered surface, and the nickel is then stripped off. *C. A.* **27,** 5257 (1933).

The nature of spongy zinc deposits obtained by the electrolysis of aqueous solutions of zinc sulfate. W. S. SEBBORN. Trans. Faraday Soc., **29,** 285 (1933).—Spongy zinc deposits are formed in general from solutions of low zinc concentration, and by the use of high current densities. The formation is due to the production of zinc hydrozide at the cathode, in agreement with the early theory of Förster and Günther (Z. Elektrochem. **5,** 20 (1898).). *C. A.* **27,** 5649 (1933). H. F. J.

Coating iron and steel. Canadian patent No. 334,903. August 15, 1933. L. P. CURTIN (to the Curtin Howe Corp.).—Protective coatings are electro-deposited on iron and steel articles connected as anodes in an aqueous solution containing 1-10% of oxalic acid dihydrate, 0.5-1% of sulfuric acid and about 1% of a soluble ferric salt at temperatures from atmospheric to about 100°C. for 1-20 minutes. An inert cathode is used.

C. A. **27,** 5257 (1933).

Protecting aluminum. French patent No. 748,514. July 5, 1933. E. WINDSOR-BOWEN and C. H. R. GOWER.—Aluminum and aluminum alloys are coated with an adherent layer of oxide or basic salt of aluminum by an electrolytic treatment, the aluminum or alloy being used as anode, with a current of 80v. or more and of 10-35 amp./sq.cm. of surface treated. The electrolyte may contain sulfuric acid, sulfuric acid and sodium sulfate, aluminum sulfate, an organic colloid dispersible in water, a salt of chromium or an oxidising agent such as an alkali nitrate or persulfate.

C. A. **27,** 5257 (1933).

Electrolytic surface treatment of aluminum. British patent No. 386,201. January 12, 1933. Vereinigte Aluminium-Werke A.-G.—In the anodic oxidation of aluminum or its alloys the electrolyte is applied as a jet or jets from a reservoir containing the cathode, which may be a carbon block.

C. A. **27,** 5258 (1933).

Surface treatment of aluminum or its alloys. Canadian patent No. 335,210. August 29, 1933. MARTIN TOSTERUD (to Aluminium

Ltd.).—An oxide coating is produced on aluminum or its alloys by means of sulfuric acid, chromic acid or sodium bicarbonate and potassium dichromate. On this coating is absorbed from solution an inorganic compound which on treatment with a solution of a second inorganic compound will form a colored compound. To produce a brown color the oxide-coated aluminum is immersed in potassium dichromate and then in silver nitrate. A reddish-brown is produced by treatment with copper sulfate followed by potassium ferrocyanide; a yellow by cadmium acetate, cadmium nitrate or cadmium chloride followed by ammonium sulfide, hydrogen sulfide, sodium sulfide or potassium sulfide. (See following patent. E. B. S.). *C. A.* **27,** 5299, (1933).

Ornamenting aluminum surfaces. British patent No. 391,903. May 11, 1933. R. S. DUNHAM.—An absorbent oxide coating produced chemically or electrolytically on an aluminum (alloy) surface is colored or rendered more resistant to corrosion by precipitating therein, by double decomposition, an insoluble inorganic compound (for example, ferro- or ferri- cyanide). Various solutions that will react to give a brown, red, yellow, white, black, blue, orange, or green color are described. *C. A.* **27,** 5303 (1933).

Prevention of corrosion of aluminum. Canadian patent No. 335,209. August 29, 1933. J. D. EDWARDS (to Aluminium Ltd.).—An absorbent oxide coating is produced on aluminum and the oxide coated surface is treated with a solution of a dichromate, chromate or chromic ion.
C. A. **27,** 5303 (1933).

Electroplating aluminum on copper. U. S. patent No. 1,927,772. September 19, 1933. J. F. CHITTUM (to Purdue Research Foundation).—A copper article to be plated with aluminum and a sheet of aluminum are placed in a molten bath comprising aluminum chloride and lithium chloride, and with the aluminum and copper respectively connected to the anode and cathode, and a current of about 0.2amp./sq.cm. of the copper is passed; when the plating efficiency begins to drop, the copper article is removed from the bath, freed from adhering plating mixture and finally cleaned. Apparatus is described. (See following abstract. E. B. S.). *C. A.* **27,** 5654 (1933).

Electroplating chromium on iron. U. S. patent No. 1,927,733. September 19, 1933. J. F. CHITTUM (to Purdue Research Foundation).—The iron is placed in a eutectic bath composed of a mixture of an oxide of chromium, sodium chloride and sodium hydroxide; the iron is made cathode and a stick of substantially pure chromium in the bath serves as anode.
C. A. **27,** 5654 (1933).

Device for drawing off the gas from electroplating apparatus and similar open vessels. Swedish patent No. 75,922. November 22, 1932. E. HARBECK.—A system of suction channels is arranged along the upper edge of the container. Structural features are given.
C. A. **27,** 5224, (1933).

Composition for inhibiting scale and corrosion formation on interior surfaces of automobile cooling systems, etc. U. S. patent No. 1,925,672. September 5, 1933. A. A. OEDLING.—Yellow sodium chromate 20, pale paraffin oil 15, sulfonated red oil 50, liquid soap 2 and water 8 parts are used together. *C. A.* **27,** 5303 (1913).

ABSTRACTS FROM THE EDUCATIONAL COMMITTEE

T. F. Slattery, Chairman

Measurement of the Throwing Power of Plating Baths

A. Onitschenko

Zeit. Elektrochemie, vol. 39, p. 815, 1933.

The author uses a cathode bent at right angles, but divided into four rectangular strips running parallel to the angle. The total weight of metal deposited on the two outer strips is then divided by the weight on the two inner strips. The smaller this ratio is, that is the more uniform the metal is distributed, the better is the throwing power. When the method was applied to chromium baths, it was found that their throwing power is best with a low sulphate content, and a low temperature, but is almost unaffected by a change in temperature at a constant current density. W. Blum.

Plating Shop Costing. E. A. Ollard.

Metal Industry (London) Nov. 10, 1933, page 471.

Costs may be assessed under the heads of labour, material, and overhead. Strictly accurate costs are not practical, but averaging expenses over a sufficient period and assessing each job on a basis of experience and common sense will, in general, be quite accurate enough.

For the small job shop, the polisher's time is generally the important item. All other costs may be grouped as overhead and assessed on the basis of the polishing time. This frequently comes to about three times the polisher's time and is so charged. This is a crude but workable system for small job plating work.

In larger shops, there will usually be a polishing shop, a plating shop, and a lacquering shop. Each shop will make its assessment against a job number. Each man keeps a time sheet to show charges against each job. Large amounts of materials may also be charged directly against a job, but most materials are assessed with overhead expenses. The overhead may be assessed separately with items for materials, power, etc., or it may be represented by a factor used to multiply the labor cost, as in the small shops. In some cases overhead is based on units of electricity used rather than labor costs. Again where articles remain in vats for a long period with little labor, an overhead based on labor and one based on time in the vats may be assessed. This applies best when heavy deposits, as for building up, are required. Where the job consists in plating a number of units, the cost of the operations on one unit may be ascertained. The job cost is then, of course, this cost multiplied by the number of units. (To be continued). C. T. Thomas.

Control Testing of Metallic Coatings. R. B. Mears.

Electro Depositors' Technical Society Preprint. Oct. 1933.

Tests of metal coatings may consist either of some form of accelerated corrosion tests, or of control testing, comprising individual tests for weight, porosity, hardness, etc. Control tests on samples of plating may be devised by research based on practical experience as to requirements.

Results from single accelerated corrosion tests have been shown to deviate widely from those obtained from ordinary exposure tests. They are indicative only of the thickness and porosity of the coating which factors may be more quickly and accurately estimated by control testing.

Control tests are useful for consumer specifications or for production control to secure reasonable uniformity and quality of product. For comparative results from different coatings or conditions, however, actual exposure tests are necessary and these must be interpreted with great care.

In discussing actual control tests, the author specifies the weight of coating as the most important single test. For plates, this may generally be determined best by weighing before and after plating. Other methods, based mostly on stripping tests, are listed. Immersion tests are criticised.

Various tests for porosity, resistance to wear, adherence, throwing power, and distribution of the deposits, are described and discussed. Also a statistical method for control of mass production is briefly outlined. C. T. THOMAS.

The right start to a better Finish

A quality finish from your burnishing barrels requires quality materials. A hard shiny surface is not enough. Real quality—the kind that gives dependable service month after month without worries about scratched parts—is determined by the heat treatment.

Abbott's controlled heat treatment produces a sound steel structure that backs up the glass-hard, mirror finished surface of balls, cones, pins, slugs. Write for the free Sample Kit of these burnishing shapes.

The ABBOTT BALL Co.
1051 New Britain Avenue
Hartford, Conn.

BEFORE AND AFTER PLATING

Materials like these

Finish Parts like these

In a Barrel like this

May
Health and Prosperity
Be Yours
During
1934

MacDermid Incorporated
WATERBURY CONNECTICUT

Please mention THE MONTHLY REVIEW *when writing*

BRANCH NEWS

PHILADELPHIA BRANCH

When Mr. Gehling asked me to read my paper, which was originally prepared and read before the American Electrochemical Society, I was elated. It made me look back over ten years of life. Just about ten years ago I made application for membership in the A. E. S. While I have been associated with plating all my life my knowledge of plating at that time was very limited.

I knew Mr. Underwood before I joined the A. E. S. and called on him many times about things I did not understand. Mr. Gehling also gave me my first introduction to barrel plating and burnishing.

At one of our meetings Mr. Charles Proctor, the founder of the A. E. S., stressed upon the importance of a plater becoming a chemist, he thought the combination of plater and chemist in one man would be a wonderful asset to the A. E. S. The last time he spoke to Philadelphia Branch he pointed out the necessity for platers to do some research work. With this inspiring thought in mind I conceived the idea, if this could be accomplished, it would be a good way to repay the A. E. S. for the knowledge I received from it. Furthermore, I would like to take this opportunity to thank the members of Philadelphia Branch for the opportunity afforded me to teach the platers' class at the Jules Mastbaum School. Between the desire and effort to find something new for the class and the pressure and supervision of the Board of Education I am getting a good pedagogical training.

BARREL NICKEL PLATING OF FABRICATED SHEET ZINC PARTS

By Albert Hirsch

Abstract

Copper plating upon a ball-burnished surface of zinc results in blistering of the copper deposits due, possibly, to a highly mechanically strained film of metal produced by the burnisher.

Nickel plating directly on a roughened zinc surface does not yield that bright metallic luster after ball burnishing which is obtainable by nickel plating a ball-burnished copper deposit. However, roughening the surface of the zinc, copper plating and ball burnishing the copper, and ball burnishing the final nickel deposit, give a reproducible finish.

Introduction

So far as is known, no instance of nickel plating fabricated zinc in a barrel, with or without a previous coating of copper, has been reported in the literature. The nickel plating of zinc, or zinc base die castings, dates back to about 1919, but many of its practical problems still remain unsolved. At that time the surface of the zinc base die casting was given a high color on a coloring wheel, cleaned in a weak alkaline solution, rinsed frequently, then plated in a cyanide copper solution, and finally plated in a nickel solution containing sodium citrate as a buffer. Later a high sulfate nickel solution was used. The nickel plating was done in a still tank at room temperature. Under these conditions black streaks, blistering and "shelling" of the deposit were common. These difficulties were overcome later by brushing the surface of the die casting with a tampica wheel

M.&W.Co. 1876

Low Cost Lacquering

Small Plated Parts that must be protected with Clear Lacquer at a minimum of expense in material and labor can be very economically finished with —

WATER DIP LACQUER

— in a dip tank while the work is still wet.

It is ideal for trunk hardware, cadmium plated steel and similar articles.

May we send you further particulars?

Maas & Waldstein Co.

438 Riverside Avenue **Newark, N. J.**

Chicago: 1336-38 Washington Blvd.

Please mention THE MONTHLY REVIEW *when writing*

and emery paste, a thin film of grease being left on the surface to prevent oxidation until plated. When required the parts were wired, cleaned in a strong alkaline solution, cyanide copper plated, rinsed, nickel plated in a high sulfate solution in a still tank, and finally colored on a wheel.

The Advantages of a Preliminary Copper Deposit

Langbein, states that zinc directly nickeled does not show the warm full tone of zinc undercoated with copper or brass and, also, that nickel deposited on brassed sheets shows a decidedly whiter tone than that deposited on copper sheets. He states further that brassing would deserve the preference if this process (both the care of the solution and the actual metal deposition) did not require extraordinarily great care, the nickel readily peeling off unless the brass undercoat was just right.

Moreover, Hammond has shown that all of the baths which have been proposed for the direct nickeling of zinc tend to give a yellowish deposit, although this may be minimised by the addition of acid to the solution. He points out that the direct nickeling of zinc presents difficulties not met with in the deposition of nickel upon copper or brass, due to the fact that zinc is more electronegative than nickel. Hence, when zinc is placed in a nickel plating solution, a non-adherent deposit of black nickel appears immediately, causing the metal afterward deposited on the zinc by the applied current, to peel.

Two methods are used at present to avoid the trouble caused by this deposition by immersion or displacement. The first is to coat the zinc before nickel plating with a more positive metal or alloy, such as copper or brass, using the respective cyanide baths. The second is to nickel "strike" the article before plating, that is, to subject it for about thirty seconds to an initial current density much higher than that employed during subsequent nickel plating.

However, during the present work it was found that by adding ammonium hydroxide to the nickel plating solution, i.e. increasing its pH, the black streaks on the zinc could be eliminated.

Barrel Plating Problems

Apart from the above considerations, the use of a barrel for the nickel plating of the zinc introduces further problems. A grinding barrel and a ball burnisher must be substituted for a polishing lathe, and a horizontal plating barrel for the still tank.

Zinc does not improve by ball burnishing, as do certain other metals. It does not acquire that warm full tone readily acquired by nickel, brass, and copper. Moreover, nickel plate even when compact but applied directly to the surface of ball burnished zinc is non-adherent (i.e., it will withstand a ball burnishing treatment), so that a new method of obtaining a bright adherent surface of nickel on zinc was sought after.

The first nickel plating solution which we attempted to use for barrel plating the zinc parts consisted of an ordinary nickel solution of pH 5.3 to which sodium citrate was added in various amounts as a buffer. This was found to be unsuitable, and after repeated failures was abandoned. A new nickel solution to which we added magnesium sulfate was prepared, the sulfate content being varied. But this solution gave a deposit with the familiar black streaks for a wide range of current densities. These black streaks were produced no matter whether the zinc parts were previously copper plated or not.

Established 1878

SPECIAL LACQUERS to meet new and unusual requirements

Ask our Technical Department about your problems.

AULT & WIBORG CORPORATION
Builders of Fine Industrial Finishes

METAL LACQUERS
IN CLEAR AND COLORS for

Silverware, Hardware, Name Plates, Lighting Fixtures, Refrigerators, Caskets, Casket Hardware and all branches of the Metal Art.

Factories: Cincinnati, Ohio
Branches and Warehouses in all Large Cities
Prompt Deliveries and Skillful Service

CROWN GEARED POLISHING LATHES

For

Economy in Operation

Made by
CROWN RHEOSTAT & SUPPLY CO.
1910 MAYPOLE AVE. **CHICAGO, ILL.**

Please mention THE MONTHLY REVIEW *when writing*

It soon became evident that the successful nickel plating of zinc in a barrel depends upon, (a) the preliminary preparation of the zinc surface, (b) whether or not it is copper plated before being nickel plated, (c) the composition and the pH of the nickel plating solution.

Method of Barrel Plating Zinc with Nickel

The author has successfully applied the following scheme to the preparation and barrel nickel plating of small zinc parts on a production basis of about 12,000 parts per day: (1) dry grinding, (2) cleaning, (3) copper plating, (4) ball burnishing, (5) cleaning, and finally (6) nickel plating. The various stages are described in detail below.

Preparation of the Zinc Surface. The zinc surface is prepared by a process which the author terms "Dry Grinding." This consists of subjecting the fabricated zinc parts, as they come from the press covered with grease and drawing compound, to a process of grinding in a horizontal barrel charged with a mixture of maplewood sawdust and powdered pumice stone. The barrel is rotated at 30 r.p.m. for five hours and the grease from the metal parts combines with the hardwood sawdust and pumice. The grinding removes all burrs left by the press operation and oxide film, and also slightly roughens the surface of the zinc.

Cleaning. As practically all of the grease and oil has been removed in the grinding process, final cleaning is accomplished in baskets with a weak alkaline solution of the following composition:

	g./L.	oz./gal.
Na_2CO_3	30	4
Na_3PO_4	30	4
NaOH	15	2

Copper Plating. After rinsing in clear cold water the parts are barrel plated in a cyanide copper solution of the following formula:

	g./L.	oz./gal.
CuCN	22.5	3.0
NaCN	34.0	4.5

The parts are copper plated one-half hour at 140 to 170° F. (60°—77° C.) using 12 v. and a current of 400 amperes per load (approx. 4 amp./sq.ft. or 0.43 amp./dm.^{2}). This gives a copper deposit approximately equal to 0.56 g./dm.^{2} or 0.2 oz./sq.ft. of surface, which is thick enough to prevent entire diffusion of the copper into the zinc with the subsequent blistering of the nickel deposit.

Ball Burnishing the Copper Deposit. The copper plated zinc parts are then ball-burnished for twenty minutes in a burnishing barrel charged with 7/32 in. (5.6 mm.) steel diagonals and a burnishing soap.

Nickel Plating. After the ball burnisher, the copper plated zinc parts are cleaned in the weak alkaline cleaner again, rinsed in clean cold water and barrel plated in the following nickel solution:

	g./L.	oz./gal.
$NiSO_4.7H_2O$	105–210	14–28
$NiCl_2.6H_2O$	22.5–47.0	3–6
H_3BO_3	15	2
$NaBO_3.4H_2O$	0.75	0.1
NH_4OH	34–68	4.5–9.0

The figures for the amount of NH_4OH in the formula are approximate. The NH_4OH is added to produce a pH of 7.6 to 8.0, determined colorimetrically using phenol red as an indicator.

The parts are nickel plated for an hour using 6 to 12 volts, with a current of 200 to 400 amperes per load (giving a c.d. of approximately 4 amp./sq.ft. or 0.43 amp./dm.^{2} at the higher voltage), at a temperature of about 90 to 140° F. (32° to 60° C.). The nickel deposit is approximately equal to 0.36 oz./sq.ft. or 1.1 g./dm.^{2} of surface at the higher current density. The nickel plated parts are then finally ball-burnished to a high lustre.

General Remarks

It should be understood that bright deposits of nickel, requiring no coloring or ball burnishing, can be obtained on polished surfaces of copper, brass, steel, zinc or zinc base die castings with the above nickel solution when used as a *still plating solution*. Preliminary copper plating enables the zinc parts to be barrel plated as well as improving the appearance of the final nickel coating.

It is interesting to note that Watts found the deposits from a sulfate nickel plating solution to be improved by additions of ammonium hydroxide. The deposits he so obtained were much brighter than those from the sulfate solution alone, "this characteristic being maintained until the solution acquired a deep blue color." Watts used only brass cathodes, but the results of the present work show that the benefits of ammonium hydroxide additions hold equally for other cathode metals. Watts also report the evolution of oxygen or the formation of nickel oxide on the anode in many of the solutions to which ammonium hydroxide had been added. Although nickel oxide formation on the anodes has been observed by us with the ammonium nickel sulfate plating solution used in the present work, 900 lbs. (408 kg.) of rolled, annealed, 99+, "depolarised" nickel anodes have been used in this solution in the past three years without any corroding difficulties being encountered.

ANDERSON BRANCH

On Monday, December 4, 1933, the Anderson Branch met at 6:30 for a dinner program at the Y. M. C. A. with Mr. O'Neill of the Mercil Plating Equipment Co. as our guest speaker. A short business session was held following the dinner.

The Plant Visit Committee reported that plans were under way to visit the plants of the American Steel & Wire Co. and the Delco-Remy Battery Division as soon as these plants resumed night operations.

Mr. Minton, as Chairman of the Program Committee, congratulated the members on their fine response to the dinner program idea.

Mr. O'Neill was then introduced and spoke very interestingly on Modern Practice in Barrel Plating.

PLATING BARRELS

Discussion by W. J. O'Neill, Vice President of the Mercil Plating Equipment Company

BARREL PLATING a subject known for close to forty years, in fairly general use for the past twenty or twenty five, has become an important factor in the industry during the past seven or eight years.

The Mercil Plating Company of Chicago, designed and built a rather crude plating barrel of wicker some forty years ago for use in a still nickel tank to plate screws for the Western Electric Company, whose work they were doing at that time. Among other things plated were large quantities of small screws all of which were being wired up at the time. The barrel was rigged up by the proprietor's son, whose job it was to do the wiring. He soon tired of the job and the plating barrel was the result. We do not claim that this was the first plating barrel made, but know that it was among one of the first.

As production of small parts increased the necessity for plating barrels gradually grew until some years later they began to appear on the market as a commercial product. The sale, however, was largely restricted for a long time to New England where most of the small metal products at that time were manufactured.

At present they are being used in nearly every manufacturing center in the country where small metal parts are made.

The Automotive industry has been largely responsible for the growth of the plating barrel industry in recent years, which has resulted in building of a better product, and is widely enough used to permit the builder of barrels to greatly further their development.

Up until a few years ago plating barrels were nearly all alike, they were made either entirely of wood or had a wood frame with celluloid panels—which permitted the use of small perforations, which was impossible in heavy wood barrels These barrels were equipped with a center rod and various dangler contacts which produced fair results.

Nickel, brass and copper were the most generally used metals for early barrel plating, the main troubles resulting in the wood barrels or frames becoming metallized in a nickel solution, which caused the metal to deposit on the cylinder rather than on the work or in the cyanide solutions the wood was softened and gradually worn away.

As production increased and cadmium and zinc were becoming large factors in the plating industry the need was seen for the development of a cylinder made from an insulating material which would have a longer life in the various solutions.

Laminated Bakelite soon proved its worth as an ideal material, due to its lightness, strength, high insulating qualities, and general resistance to most of the common plating solutions.

With the advent of the Bakelite cylinder, came new methods of making contact with the work and conducting the negative current.

It was soon obvious that with improved Bakelite Cylinders and conducting mediums that greater production could be obtained by using higher current densities, warmer solutions, the addition of caustic elements and better control of solutions.

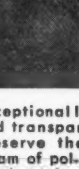
Where formerly solutions operated at room temperature were almost the rule, the present day methods require many warm and even hot solutions; some

KEEPS METALS LIKE NEW

Exceptional lustre and transparency preserve the gleam of polished metals.

NON-SPOTTING HARDWARE LACQUER #5700

RESISTS *the ravages of* WEAR *and* TIME



The non-spotting-out features of #5700 are remarkable. When #5700 is used, spotting-out rarely occurs.

Its exceptional flow-qualities adapt it especially to dipping brass and die-casting alloys, with a thoroughness and evenness that provide complete protection of finish with full preservation of beauty.

Further, it is absolutely non-striating. You may use it successfully on objects of any shape.

Every attribute of #5700 recommends it, since wear and time have hardly any affect on it.

Among the types of articles for which #5700 is particularly popular are outdoor and indoor metal signs, novelty metal goods, metal clocks, lamps, builders' hardware, and countless others.

Eastern Sales

THE ZAPON COMPANY

A Subsidiary of Atlas Powder Company

STAMFORD • CONNECTICUT

Western Sales

ZAPON-BREVOLITE LACQUER COMPANY

NORTH CHICAGO • ILLINOIS

being heated by current resistance and others by steam coils or immersion heaters.

Some nickel and copper solutions, many cadmium and zinc solutions and practically all tin solutions, either utilize or produce heat.

Bakelite being practically unaffected in most acid solutions, has a very definite life in the cyanide or other caustic solutions, depending on the caustic content of the solution under varying degrees of temperature.

Any number of Bakelite Cylinders are in use today after more than five or six years use in Nickel - Brass - Copper and Acid Zinc under ordinary operating conditions.

In the meantime many of the same type cylinders have been completely broken down in five to six months in certain Cadmium - Cyanide Zinc and Tin Solutions.

The cause of most of these failures in such a short time are due to the hot caustic solutions, long hours of continuous operation, rough handling, and lack of attention or care of the equipment.

One of the common causes of cylinder damage is lack of attention to the cathode contacts in a cylinder. So far it is impossible to produce a contact that will not plate, naturally contact treeing is inevitable, and best results can only be obtained by keeping the metal deposit on contacts down to a minimum. Badly treed contacts draw excess current, waste metal and if allowed to remain too long make it impossible to remove it without damaging the cylinder, thus adding to the unit cost of production and shortening the life of the cylinder.

Bakelite Cylinders being rather expensive in comparison to the wood barrel costs must reasonably be expected to prove their value, and in most cases have more than justified their cost. Commercial nickel plating which formerly required one to two hours is now possible in twenty to fifty minutes, other metals are plated in proportionately less time, and the only drawback to the universal use of Bakelite Cylinders in all solutions, is the comparatively short life in the hot caustic solutions.

Many experiments have been made during the past few years to discover some material that would compare with Bakelite and still be able to withstand the destructive action of caustic chemicals in those solutions. Various Bakelite combinations were tried, commercial hard rubber, absestos products, glass and several synthetic compounds were tried, but none seemed to have the characteristics necessary to withstand all of the harsh solutions.

Partially by accident and by research a new compounding of hard rubber that is practically impervious to all plating solutions, with the possible exception of Chromium, was worked out by one of the leading rubber manufacturers in conjunction with a plating barrel manufacturer about three years ago.

Tests and experiments have been conducted since that time in the further perfection of this material, to overcome excessive shrinkage which appeared to be one of the few unsatisfactory features. A series of heat treatments has solved this problem and today, after three years of tests under varying conditions, this hard rubber cylinder can be used in any type of the common solutions, with heavy leads up to a temperature of 160 degrees Fahrenheit.

The use of Bakelite and Rubber have therefore helped considerably to bring plating barrel practice up to a much higher efficiency than ever before.

These splendid materials have made it possible to embody engineering principles into the manufacture of plating barrels, to permit their greater efficiency—such as adequate cathode conductors, contacts of such a variety as to meet almost

any demand for various classes of work to be plated, and also many sizes and designs of panel perforations to accomplish desired results on all classes of work from common pins and needles to fairly large castings, stampings and forgings.

The importance of the proper selection of plating barrels should not be overlooked, some platers being under the impression that a plating barrel is just a plating barrel—and the same thought should be given to this matter as in the selection of a machine tool to produce the metal parts. The job plater probably has not the same opportunity of this selection as has the manufacturer and his choice must be restricted to use barrels which permit the processing of the wide variety of work the usual job shop is required to handle, bearing in mind that real small perforations in cylinders require a longer time to plate than larger ones and where possible a small extra cylinder should be kept to take care of real small work so as not to penalize himself where the largest part of the work could be done in barrels with larger perforations.

The average manufacturer who maintains a fairly large mechanical plating department can well choose his barrel equipment to produce the best results on the largest part of his product.

The Mercil Companies, with which I am associated, and who operate the largest exclusively mechanical plating plant, I believe, in the country and who also produce a very considerable amount of barrel plating equipment, qualify me to make a few recommendations in the use of mechanical platers.

Producing finished plated work at the lowest possible unit cost is the aim of every good plater and the following suggestions will help to obtain results:

1—Maintain a uniform strength of solution at proper level in tank, bearing in mind that for every inch below proper solution level from ½ to 1 square foot of anode surface is lost.

2—In modern practice in barrel plating it is practically impossible to have too much anode surface. For nickel especially use as many anodes as is possible to hang between the two ends of the cylinder.

3—Use barrel with largest perforations possible.

4—Do not overload cylinders—the area of the work must be in reasonable proportion to the available anode surface—overloading often causes a non-uniform deposit of metal. Remember that 25 lbs. of pins often has more surface than 100 lbs of screws, this is especially important in nickel and brass plating.

5—Keep cylinder contacts as free from excess treeing as possible, even if it must be done daily to eliminate waste of metal and excess current.

6—Wherever possible see that best type of cathode contacts are used for the product being processed, often a simple contact change means double production.

7—We recommend the use of Bakelite Cylinders for Nickel, Brass, Copper, Acid Zinc and cold Cadmium solutions having little or no caustic, and Rubber Cylinders for Cadmium containing more than 2 oz. caustic, Cyanide Zinc and Tin solutions. Bear in mind that rubber, while being substantial enough for all ordinary purposes is not as tough a material as Bakelite for rougher handling.

8—In multiple cylinder tanks, where heavy loads are run a cooling coil should be put in to keep excess temperature down.

9—Give mechanical platers the same care and attention that the average machine tool gets and they will serve you accordingly.

CHICAGO BRANCH

The regular monthly meeting of the Chicago Branch was held December 9 at the Atlantic Hotel. President E. G. Stenberg presiding and all other officers present. The meeting had a large attendance due to the interesting subjects provided by our Educational Committee.

A letter was read from our National Secretary, Mr. Gilbertson, regarding the dates of our next Convention to be held at Detroit, June 11, 12, 13, 14. These dates were voted as satisfactory to the members of Chicago Branch.

The librarian introduced Mr. D. J. Hickey of the Travelers Insurance Co. who gave a very interesting and instructive talk on the Health Hazards of the Plating Industry, explaining some of the methods by which they check and count dust that is too fine to be seen with the naked eye. Mr. Hickey was given a vote of thanks by the entire Branch.

Mr. Servis read the paper published by our National Educational and Program Committee which proved to be of real merit and started you thinking about things we all may neglect at times.

Mr. Servis, chairman of the Smoker Committee, reported that all arrangements for the Smoker to held January 20, at the Auditorium Hotel were complete.

The librarian found the following questions in the box:

*No.*1. *How long a time would it require to deposit* 4/10.1000 *of chrome using a* 40 *oz. chrome acid* 4/10 *sulphate at* 6 *volts* 300 *Amp.* 110° *Far.*?

Ans. ½ to ¾ hr.

No. 2. *How can mineral oil be removed from a Nickel Bath*?

Ans. Use plenty of tissue paper skimming the oil off the top of the solution.

No. 3. *Is* 5 *to* 6 *volts pressure suf-*

Educational Meeting

Get Together

Smoker

CHICAGO BRANCH

Extends to you an invitation to attend their Smoker to be held

Saturday, January 20

1934

Auditorium Hotel

Michigan Ave. and Congress St.
Michigan Ave. Entrance.

in the

BLUE BALL ROOM

2nd Floor

A Short Educational Program Will Start at 6.30 P. M.

Then

"Get Together"

For

Lunch Smokes

Good Cheer

All members are requested to attend and bring an interested Plater. A charge of 50 cents per person for those attending.

Buy Your Tickets at the Door

We'll Be Seeing You

Don't Forget
The Date
The Place
The Time

The Committee

ficient for cadmium plating in Mechanical Barrels?

Ans. Yes.

J. W. HANLON. *Secretary.*

CLEVELAND BRANCH

The monthly meeting of the Cleveland Branch was held on Saturday, December 2nd, with President Ter Doest in the chair. The regular order of business was suspended, and the meeting was turned over to Mr. Geo. Hogaboom, guest speaker, who gave a talk on the results of exposure test of Nickel, Copper and Chromium Plated Steel and their protective values, showing panels that had been exposed in various locations throughout the country. Salt spray and outdoor exposure. At the conclusion, Mr. Hogaboom was given a hearty vote of thanks.

We had as visitors some members of the American Electro-Chemical Society.

The meeting adjourned at 10:00 P.M.

W. D. SCOTT, *Secretary.*

THE HARTFORD-CONNECTICUT VALLEY BRANCH

Held its regular monthly meeting on Monday evening, November 27, 1933, at the Hartford Chamber of Commerce.

The meeting was called to order at 8:30 P.M. with President Fleming in the chair. Minutes of the previous meeting were read and accepted. All communications were read and placed on file.

There was no speaker for the evening, but Mr. Stoddard, one of our associate members, gave us one of the most amusing and entertaining evenings that we have ever had at any of our branch meetings. He entertained with some very clever magic and card tricks. The members who were absent from this meeting sure missed a treat and an evening of real fun.

Meeting adjourned at 10:30 P.M.

VERNON E. GRANT, *Secretary.*

NEW YORK BRANCH

At our November 24th meeting, Newark Branch paid us an unannounced return visit. We were also honored at this meeting by the presence of Dr. Pan.

Some very good questions came up for discussion on practical plating and with the added knowledge and experiences of both Dr. Pan and members of Newark Branch, were well answered.

Librarian Sage of Newark told us of a contemplated "Old Timers' Night," to be held at Newark in the near future. The purpose of this affair as Mr. Sage put it, is to show the "old-timers" that the younger element of the branch can show them a good time. Though the main purpose is to get all the older members out — with the younger ones —and renew old friendships and create new ones.

Mr. Sage went on to say that considering that the "old-timers" of both Newark and New York Branches are well known to each other he would like the loan of a member of the New York Branch to meet with his arrangement committee so as to have the full support of our Branch.

Pres. Rolfe asked Mr. MacStoker if he would meet with the Newark committee, considering Mr. MacStoker's wide acquaintance with members of both branches.

At the Dec. 10th meeting, our so-called Good and Welfare Committee began to function. It is the work of this newly formed body, consisting of Mr. Stremel, Mr. MacStoker and Mr. Fisher, to gather material for Good and Welfare discussions and to arrange for speakers on both practical and technical subjects relating to the plating art.

Some very interesting and modern plating practices and finishes were discussed, giving up to the minute knowledge of the latest of plating procedure to our members.

Two of the members at this meeting showed samples of plated work, inquiring the best and most economical way to produce their work in volume. The various suggestions of methods and formulas best suited for the particular work were very helpful to the members.

Pres. Rolfe read a paper on, Cleanliness and Order, written by Edward H. Tingley, Secretary of the National Association of Foreman. This paper, the first of a series on such topics as, Executive Principles, Organization and Industry, Principle of Good Management, etc., caused some lively discussions on the floor of the meeting.

We look forward to the reading of the next paper, for it is the discussions of these things which form the foundation of real progress for the individual foreman and superintendent.

ARTHUR WALLACE, *Rec. Secreary.*

NEWARK BRANCH

The Newark Branch has had some fine talks since the winter season set in. Our librarian Mr. Bert Sage has surely been on the job and has had a fine lot of speakers. Starting with Mr. O. Sizelove on Oliver's Nite whose subject was Coloring Steel. And after visiting Sandy Hook on Sept. 30, the following Friday, Oct. 6, 1933, Mr. George Hogaboom spoke on the test plates and results obtained at the different sections of thec ountry. Then on Oct. 20, we had Dr. Schumerfelt and his subject was Alloy Depositions of Metals. Dr. Schumerfelt's talk was indeed fine and with the help of charts which he made showed the effect cyanide and metal has in an alloy solution. Then on Nov. 3rd we had our Librarian give a talk on the How and Why of Amperes. Then on Nov. 27 we had Mr. Eckelman whose subject was Parkerizing and Benderizing and Mr. L. Eckelman sure did know his subject and he enlightened many of us with new tricks of getting fine crystal deposits. Then on Dec. 3rd we had our own B. Holgram who spoke on Hot Turning and Galvanizing.

On Dec. 15 we had our Moving Night with our own David X. Clarin at the controls. First Picture was called Silver, describing the manufacture of Sterling Silverware. Then came comedies and other educational pictures. On Jan. 5, we will have talks on cleaning. So you see we are having the best year Newark has ever had in the line of talks and the members of Newark Branch who missed these talks sure missed a lot.

Do not forget our Old Timer's Sessions on Saturday, April 7, 1934. We expect all the old timers, no matter whether you belong to the A.E.S. now. We want you all to attend this evening session on Sat., April 7, 1934.

GEORGE REUTER, *Secy.*

WATERBURY BRANCH

Engineer's Hall was well filled at the December meeting of the Waterbury Branch to greet George B. Hogaboom, organizer and first president of the local Branch. George manages to find time during the year to pay the local boys a visit and his coming is looked forward to with pleasure. On this occasion the subject of his talk was "The Results of Outdoor Exposure Tests of Plated Steels," and it proved quite interesting. The lecture was illustrated with slides and showed some of the work being done at the Bureau of Standards under the direction of Dr. Blum and Mr. Strausser. Samples of the work showing the degree of corrosion being encountered at the various testing stations were passed around for inspection. The different methods of testing for corrosion were also touched upon.

The speaker laid considerable stress upon the difficulty experienced in collecting sufficient funds to keep the research work going. He thought some of the manufacturers did not seem to

realize the importance of this research work, and advocated the devising of ways and means of getting the work of the Research Bureau before the meetings of Manufacturers Associations.

At the conclusion of his talk the speaker answered many questions relative to his subject. A rising vote of thanks was extended the speaker.

Previous to calling on Mr. Hogaboom, President Elwin announced that Philip J. Lopiesti, a member of Waterbury Branch would present a paper entitled "Alkalinity and pH in Nickel Solution" with abstracts contributed through the courtesy of the La Motte Chemical Company. Mr. Lopiesti's paper proved of interest to all in that phase of the plater's work, and as President Elwin said, he hoped that the presentation of this paper at the Branch meeting would be emulated by more of the members. After a short discussion, Mr. Lopiesti answered questions pertaining to his paper. The President extended the thanks of the Branch and the meeting was adjourned.

W. F. GUILFOILE, *Secy.*

(Mr. Lopiesti's paper will be published in the February Monthly Review.)

BOSTON BRANCH

On Thursday, December 14th at the American House at 8 P. M., Mr. George B. Hogaboom, who needs no introduction to the Branch, addressed forty members and guests, effectively detailing the facts which have been ascertained by study of exposure tests on samples of plated steel.

The samples exhibited were from Key West, Pittsburgh, Sandy Hook, and New York City, and from the angle of resistance to rusting there is no question but that .001 of nickel is far superior to any combinations of nickel and chromium and nickel, copper, and chromium of the same thickness.

The exposure tests also prove that in the case of cadmium and zinc coating of the same thickness as cadmium has greater rust resistant properties in industrial centers where sulfur gases are present in the atmosphere than cadmium but the opposite is true on the sea-coast in salt air where the atmosphere is comparatively free from sulfur fumes.

After talking for an hour and a half Mr. Hogaboom answered questions for another two hours. Considering the meeting as a whole there has never before been so great an amount of valuable information disclosed to the members of Boston Branch.

Mr. Hogaboom was given an enthusiastic rising vote of thanks and the Branch is deeply indebted to Mr. Clarke who was vitally instrumental in obtaining the speaker who so ably exposed these newly discovered facts about the electro plated finishes.

The meeting was conducted by Mr. Louis A. Gale, presiding.

A. W. GARRETT, *Sec'y.*

DETROIT BRANCH

The December meeting of Detroit Branch was called to order at 8:15 P.M. Friday, December 1, by Mr. Gordon Spencer, Vice-President. The president being absent on account of unavoidable personal business.

Minutes of previous meeting read and approved.

Three applicants for membership reported O.K. by the Board of Managers, and elected to membership.

Mr. George Fry, 512 N. Chestnut St., Lansing, Mich.—Active.

Mr. Benjamin Fry, 522 N. Chestnut St., Lansing, Mich.—Active.

Mr. Leo A. Long, 1651 Beard Ave., Detroit, Mich.—Active.

The Question Box was then conducted by acting Librarian, Mr. B. F. Lewis.

While the questions were being discussed, a phone message from Supreme Secretary, Mr. Gilbertson of Chicago was received, stating that while he had

no authority actually to sanction the date submitted by us for the Convention, he assured me that it had not received serious objections, and that he recommended us to go ahead with our committee work on the Convention. This, however, did not meet with approval of the meeting, and the Secretary was instructed to wire him as per previous action taken, that of ten days' approval or refusal of date submitted by us.

Question No. 1: Has anyone used Hydrogen or Sodium Perborate in a Cyanide Copper bath?

Answer: No authoritative reason for using, but should do no harm to bath.

Question No. 2: What are the relative merits of 99% depolarized as compared with 99% carbonized anodes? What makes a good nickel anode "good?"

Answer: It all depends on condition of solutions, current, temperature, distance of cathode from anode. Opinions on the merits of depolarized and decarbonized anodes were divided about 50—50.

Question No. 3: How much copper is needed for a quality plate job, if any? (Under nickel and chromium.)

Answer: If thin copper is used, then there must be a heavy nickel deposit to make up for it in sufficient thickness to make a good job. The thickness of deposit of either copper or nickel is not as important as a non-porous deposit is.

Question No. 4: Can a straight piece of steel tubing be plated with successive coatings of nickel and then bent to size without the nickel cracking, or the coating segregating?

Answer: Yes, by using Madsenell Process.

Question No. 5: Can black nickel be plated in a barrel?

Answer: Yes.

Question No. 6: What about new bright nickel solutions that are being introduced?

Answer: At our next meeting, January 5, Mr. Paul M. Amanda will read a paper on this question, and then no doubt there will be many questions answered by him, and then discussion. Much should be brought out on this question. Mr. Amanda is connected with the Parker Rust-Proof Company, and is operating one of the Pyrene Bright Nickel Solutions.

Question No. 7: Why is it that more than 10 gr. per sq.ft. of nickel direct on Zinc die cast furnishes less protection than 8 gr. per sq. ft.

Answer: Left open for discussion. Let us hear from some Die Cast Electro-Plating experts, or give us an opinion.

After the questions, Mr. Spencer, Vice-President, took the chair, and questions for the good of the order were invited. It was decided that hereafter the Society have some educational feature prepared for it by the Educational Committee. Also that all business be taken up before the meeting of the Society by the Board of Managers and officers, and thrashed out and settled, so that there will be no necessity for much discussion and time taken from the meeting. Meeting adjourned at 10:30 P.M.

THEODORE C. EICHSTAEDT,
Secretary-Treasurer.

TORONTO BRANCH

Secretary Graham issued an unusually cordial request to our members to attend the November meeting, and did the boys turn out? Yes, sir. And they came primed with all manner of ideas. James Cairns hit the high spots and Charley Kemish produced the scientific touch when problems were discussed. We have missed the fine letters we used to receive from James Welsby and Dave Ayers. Other out-of-Toronto members take a hunch and drop the secretary a line telling of

your work. Our Executives are going to probe into the cause of non-attendance of Toronto members and I think they will fine them for indifference, non-appearance, or "sumpthin."

Our Question Box.

Ques.—What is best deposit for Automobile reflectors?

Ans.—Silver has highest reflecting power.

Ques.—What will cause silver strike to deposit rough coating?

Ans.—Excess cyanide, excess silver, excess current.

Ques.—What are indications of alkalinity in a nickle solution? What is the effect on deposit?

Ans.—Solution becomes cloudy and deposit will be dark and brittle.

Ques.—What will cause voltage to register on brass bath when load is in tank and all switches off?

Ans.—Local battery action between anode and cathode.

Mr. Bloxall of Montreal Branch was with us. He will be in charge of all plating for Canadian Pacific Railway, East of Winnipeg, and the plant is on the twenty-second floor of Royal York Hotel.

Earnest Coles has all the garden stuff wrapped up for winter.

H. W. GRAHAM,
Secretary.

	Branch
APPLICATIONS	
Leo A. Long, 1651 Beard Avenue, Detroit, Michigan	Detroit
John D. Lee, 13610 Limhurst St., Detroit, Michigan	Detroit
George Fry, 512 N. Chestnut St., Lansing, Michigan	Detroit
Benjamin Fry, 522 N. Chestnut St., Lansing, Michigan	Detroit
Dr. Carl Schumerfelt, Baker & Co., Newark, N. J.	Newark
ELECTIONS:	
Leo. A. Long, 1651 Beard Avenue, Detroit, Michigan	Detroit
John D. Lee, 13610 Limhurst St., Detroit, Michigan	Detroit
George Fry, 512 N. Chestnut St., Lansing, Michigan	Detroit
Benjamin Fry, 522 N. Chestnut St., Lansing, Michigan	Detroit
REINSTATEMENTS:	
M. Ludwig, 11304 Wallace Street, Chicago, Illinois	Chicago
Willis Harvey, Cascade Road R. R. #1 Ada, Michigan	Grand Rapids
R. Hoenstine, c/o American Wire Fabric Corp., Mt. Wolf, Pa.	Philadelphia
H. C. Simmons, 219 Pryor St., Atlanta, Ga.	Philadelphia

RESIGNATIONS:

W. S. Hathorne	Chicago
E. G. Lovering	Detroit
W. J. Patterson	Detroit
Morris Metz	Philadelphia
L. N. Strunk	Philadelphia

SUSPENSIONS:

Boston Branch — Wm. B. Rideout. *Chicago Branch* — G. Relitz, P. Gugine, V. J. Huebner, A. M. Kappler, J. Christenson, H. Gausing, Jos. O. Hall, A. L. Radlein, H. Housan. *Detroit Branch* — G. A. Barrows, W. Berger, F. P. Brockway, Stuart Cholvin, Jas. Fritts, O. E. Gollnick, M. Kronibus, J. F. McCullough, A. Partenski, Francis Revell, J. J. Schultz, B. Summerfield, Walter Wrenn, W. E. White, Raymond Zinn. *Grand Rapids Branch* — L. E. Heasley. *Providence Branch* — Walter Pickels, Chas. Kinzle.

NEW LOCATION

The Ault & Wiborg Corporation announces the removal of its Chicago Offices on January 1st. to 1240 W. Washington Boulevard.

In this location they will have larger quarters and better facilities, a larger stock will be carried and prompter service can be rendered in the furnishing of special materials in all the lines of industrial finishing.

With Mr. R. J. Hazucha in charge as Chicago District Manager, the staff also includes: Mr. George B. Lemon, Mr. Floyd A. Burns, Mr. C. E. Stiers, Mr. R. F. Bell.

and

ge to
is in

ween

was
of all
lway,
is on
York

arden

AM,
etary.

ranch
etroit
etroit
etroit
etroit
ewark

etroit
etroit
etroit
etroit

icago
apids
lphia
lphia

n an-
icago
0 W.

larger
larger
r ser-
shing
nes of

rge as
staff
emon,
Stiers,